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Discussion Paper

MAJOR WAGE SETTLEMENTS WITH COLA CLAUSES ESTIMATING WAGE INCREASES AT SELECTED INFLATION RATES 1978-1980

Labour Canada Travail Canada

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MAJOR WAGE SETTLEMENTS WITH COLA CLAUSES – ESTIMATING WAGE INCREASES AT SELECTED INFLATION RATES 1978-1980

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PREFACE

Until now, no sustained effort has been made to assess and quantify on a current basis the contribution which COLA clauses make to wage change in major collective agreements. Among published reports, the Bank of Canada has analyzed agreements with COLA clauses ex post on two occasions using information published in Labour Canada's "Collective Bargaining Review" (see Bank of Canada Review, April 1975 and December 1979). Research along similar lines was undertaken by David A. Wilton and published by the Economic Council of Canada as Discussion Paper No. 165, March 1980.

Recognizing the problems of interpreting trends in wage-settlement data containing COLA clauses, the Economic Analysis Branch undertook the developmental work of assessing and quantifying the wage change attributable to them. In order to capture as accurately as possible wage change originating from the COLA clause, source documents were examined. The quantification of COLA clauses is to serve two objectives:

- to estimate wage increases with COLA payments in major wage settlements using selected CPI projections;

- to measure wage increases with COLA payments, using the actual inflation rate during the life of an agreement

The focus of this research report is on the first objective. COLA clauses are quantified under the assumption that certain rates of inflation would prevail over the contract term. Work on the second objective is in progress.

The developmental work was undertaken by Sharon Michaud. In her task as project leader, she was assisted by Jean-Charles Roy, a co-author of this paper. Competent assistance in assessing, quantifying and coding of COLA clauses was provided by David Westrop and Aline Potvin. Phil Reed was responsible for the development of the software program.

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I - INTRODUCTION AND SUMMARY

The quarterly major wage settlement data published by the Labour Data Branch of Labour Canada are an important indicator of wage change in the unionized sector. Among other data, increases in base rates of pay are reported for all agreements reached during a given period, and separately for contracts with and without COLA clauses.[1] Agreements with COLA clauses have on average shown lower increases in base rates than those without COLA clauses, simply because the eventual contribution of the COLA clauses to wage increases is not easily assessed. This reduces the value of the wage settlement data as an accurate forward-looking indicator of wage change. The significance of the change due to COLA clauses in any given time period depends on the relative weight (in terms of employees) of COLA agreements and the varying "richness" of the clauses. These factors can vary considerably on a quarterly basis giving rise to important differences in the size of reported increases.

Each major agreement with COLA between 1978-80 was evaluated to estimate the effect of negotiated-wage-plus-COLA increases. Since the inflation rate over the life of the contract was not known in advance, it was assumed a steady rate would prevail. Three rates were used: 6, 8 and 10 percent per annum. This range was chosen to illustrate the operation of triggers and caps and also to approximate the (then) current inflationary environment of 9 to 10 percent annually. The influence of higher inflation rates on wage increases is discussed in Section IV. The clauses were assessed accordingly, taking into account all the stated characteristics and restrictions specified in the formulae. The resulting estimates then give a snapshot of expected effects of COLAs under the three assumed rates. It should be emphasized that the results are only estimates since the actual CPI movements were unknown.

This paper outlines in some detail the method of evaluation and quantification of COLA clauses. To set the stage, Section II reviews briefly the growing incidence of COLA agreements in major wage settlements, that is, collective agreements covering 500 or more employees in all industries excluding construction. Selected characteristics of agreements with COLA clauses are examined as well as certain characteristics of COLA clauses of agreements reported from January 1978 onward. Section III elaborates, by means of examples, the method of COLA quantification. The Effective Wage Rate, which incorporates COLA fold-ins and floats, is defined. Also, this section introduces three other wage rates in addition to the base rate of pay currently used for measuring wage change. The Low, Mid and High wage rates are used to determine the variability of wage change, and to illustrate the impact of COLA clauses

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[1] See "Wage Developments Resulting From Major Collective Bargaining Settlements" Labour Data Branch, Labour Canada, quarterly and annual issues.

on relative wage levels within a bargaining unit. This influence is shown in both nominal and real terms. Lastly, a measure of COLA responsiveness is introduced and compared with related elasticity measures. Section IV summarizes the estimated effective wage increases of agreements with COLA at selected wage rates and at given rates of inflation. Data are presented at the aggregate level with selected sectoral subaggregates. The paper concludes with some observations on work which is currently under way.

II - INCIDENCE AND CHARACTERISTICS OF COLA CLAUSES IN MAJOR WAGE SETTLEMENTS

A. Incidence

The past decade has witnessed not only a considerable overall increase in the CPI but also a great deal of volatility in its movement. In 1971, the annual increase of the Canada All Items CPI was 2.9 percent. Within three years, it had risen to 10.9 percent. An Anti-Inflation program was implemented in 1975 in an attempt to control the rapid rise in prices and labour costs. Subsequently, the rate of increases moderated to 7.5 percent in 1976, but has risen steadily since to 9.1 percent in 1979, hovering around 10 percent in 1980.

The high and variable rate of inflation has also led to uncertainty in industrial relations. The protection of wages from erosion by inflation has increased in importance and bargaining parties have responded accordingly. One mechanism commonly employed to alleviate the effects of inflation is the COLA clause. It is usually a formula relating wages to movements in the CPI, paying out a given amount of money for a specified change in the price index agreed upon by the bargaining parties.[2] The uncertainty, associated with unexpected movements in the CPI during the life of a contract, is therefore reduced. The bargaining parties using a COLA clause need not renegotiate wages at frequent intervals since wages are being automatically adjusted to a greater or lesser extent for the effects of inflation.

Given the inflation experience of the past decade, one would expect wage indexation in the form of COLA clauses to have increased. This has indeed been the case, particularly during the early part of the '70s. Both the number of settlements reported containing COLA and the number of COLA agreements in force increased rapidly until 1974-75. This was followed by a stabilization and slight decline coinciding with the AIB control period, while currently, both series are rising.

Chart 1 compares changes in the number of COLA agreements concluded and in force with annual CPI increases. The top frame shows the rise in consumer prices during the period 1970 to 1980. In 1974, the rate of increase was 10.9 percent and declined during the period of AIB controls but never went below 7.5 percent (1975-76). The acceleration in price increases during the early part of the '70s provided an atmosphere of uncertainty about price movements and their effect upon wages. This

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[2]The question of what constitutes an appropriate index for wage adjustments is beyond the scope of this paper. For some basic considerations, consult M.F.J. Prachowny "The Effects of Wage Indexation on the Macro-Economic Performance of A Small Open Economy". Labour Canda, Discussion Paper, February 1980, pp. 100-106 and, M.C. McCracken and E. Ruddick, Towards A Better Understanding of the Consumer Price Index, Economic Council of Canada, Occasional Paper, 1980

was reflected by increases in the number of wage settlements containing COLA (middle frame) and in the increase in the stock of COLA agreements in force (bottom frame) over the period. The stabilization and slight decline in the rate of increase of the CPI was followed by similar changes in both series. Currently, the incidence of COLA is again on the rise, consistent with price increases experienced since 1976.

A distinction is made between COLA settlements reported and COLA agreements in force.[3] COLA settlements are influenced by the bargaining cycle and the bargaining parties' perception of their need for an indexation formula. COLA agreements in force on the other hand represent the stock of COLA agreements in effect at any one time and are influenced by the additions, deletions and renewals captured in the new settlements series. Table 1 below lists the number of employees covered by COLA clauses of major agreements in force. At the end of 1971 some 304 000 employees covered by major agreements - about 19 percent of all employees - had such a clause. By 1980, the absolute level of COLA coverage approached 1 million employees or 47 percent of the total.

Table 1

Major Agreements in Force 1971-80
Employees Covered ('000)
By Major Sectors[4]

	(1)	(2)	(3)	(4)	(5)
In Force End of	All Employees Covered	All COLA Empl.	COLA Empl. Commercial	Of Which Manufact.	COLA Empls. Non-commerc.
1971	1 631	304	258	186	46
1972	1 664	356	252	186	104
1973	1 721	423	294	205	129
1974	1 811	631	437	296	194
1975	1 846	885	624	321	261
1976	2 073	910	609	292	301
1977	2 093	804	534	230	270
1978	2 097	735	426	243	309
1979*	2 067	917	526	223	391
1980*	2 077	966	587	257	379

*Estimates

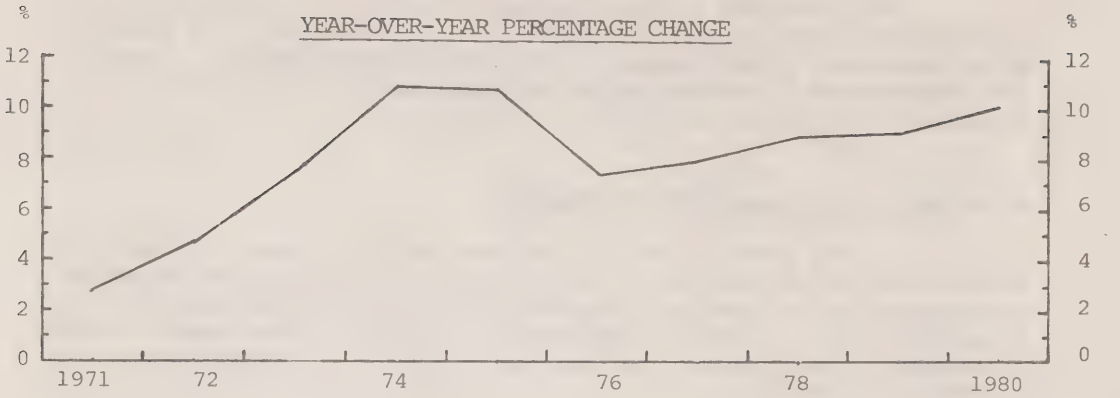
Note: Figures may not add due to rounding
Source: Collective Agreement Data Base, Labour Data Branch, Labour Canada

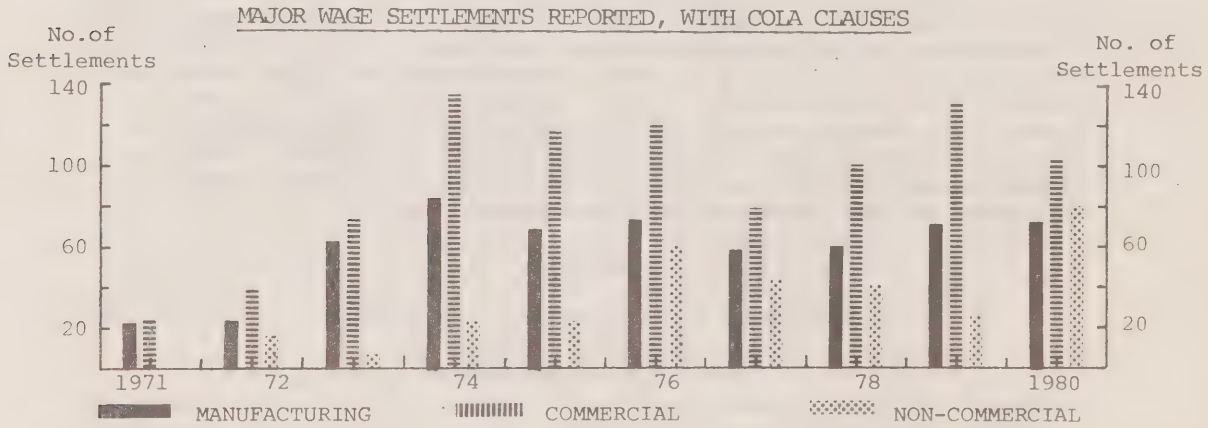
[3]The definition of COLA agreements in force by the Labour Data Branch includes inoperative or suspended COLA clauses.

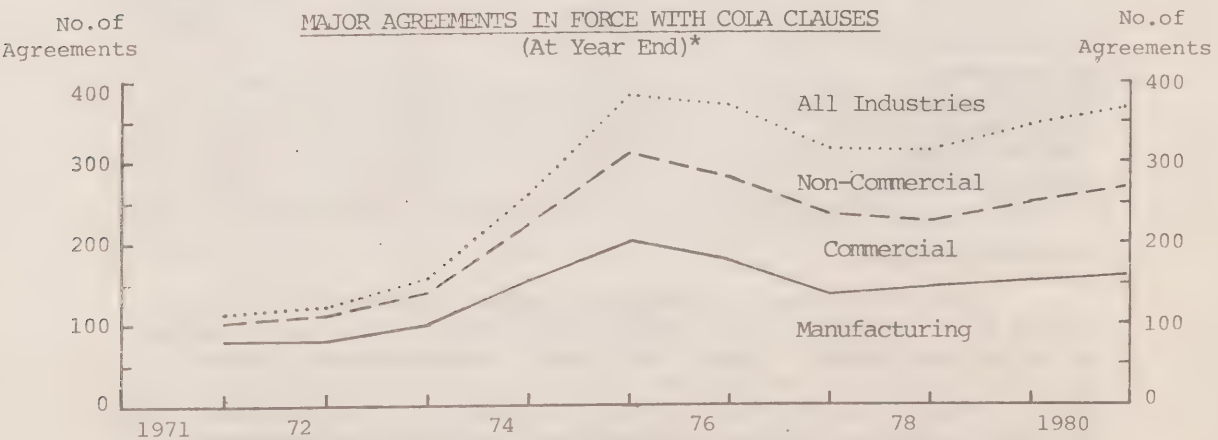
[4]For a definition of Commercial, Non-commercial see Appendix 1.

CHART 1

CONSUMER PRICE INDEX







Source: Consumer Price Index; Statistics Canada, Cat. No. 62-001
Wage Settlements Reported; Collective Agreements Data Base, Labour Canada
* Agreements in force; Collective Agreements Data Base; estimated for 1979-80

The incidence of COLA clauses in the manufacturing sector dominated the early part of the decade. Their popularity soon spread to other commercial industries and to the non-commercial sector, which in 1980 represented 39 percent of all employees with COLA clauses (see Appendix 2 for further details).

B. Characteristics of COLA Agreements

In the previous section, we examined the growing incidence of COLA clauses by major sector. The purpose of this section is to review selected characteristics of agreements with COLA, such as size of bargaining units, duration of agreements, and size of base rate increases. In some cases, the data are limited to wage settlements reported in 1978-79.

Size of Bargaining Unit

The size of bargaining unit is significant from a number of perspectives. It is commonly associated with the relative influence a union has on the bargaining outcome. The existence of a COLA clause may, therefore, be more prevalent in larger bargaining units. As shown in Table 2, the average size of all COLA agreements reported in 1978-79 is 22 percent greater than in Non-COLA agreements. The sectoral breakdown reveals sizeable variations ranging from 20 percent in non-commercial industries to some 33 percent in the commercial sector.

Table 2

Major Wage Settlements Reported 1978-79
Average Size of Bargaining Unit
COLA/Non-COLA Agreements

	COLA Agreement	Non-COLA Agreement	Percentage Difference
All Agreements	2 277	1 867	22.0
Non-commercial	2 444	2 036	20.0
Total Commercial	2 231	1 681	32.7
Manufacturing	1 538	1 164	32.1
Other Commercial	3 175	2 082	52.5

Agreement Duration

The consequences of unexpected inflation on wages can be reduced by an agreement incorporating a COLA clause. This would permit the bargaining parties to enter into longer-term agreements, thereby reducing the frequency of wage renegotiation and possible confrontation. Table 3 compares the average duration (in months) of COLA agreements with Non-COLA agreements. At the all agreements level, COLA agreements with a duration of 31 months are on average 75 percent longer than their non-COLA counterparts in 1978-79.

Table 3

Major Wage Settlements Reported, 1978-79
Average Duration in Months
COLA/Non-COLA Agreements

	COLA Agreement	Non-COLA Agreement	Percentage Difference
All Agreements	31.1	17.8	74.7
Non-commercial	31.5	16.9	86.4
Total Commercial	31.0	18.4	68.5
Manufacturing	31.7	21.5	47.4
Other Commercial	30.6	17.1	78.9

It is not suggested that major wage settlements reported in 1978-79 are a representative sample of the COLA/Non-COLA split and therefore of average contract length. The bargaining cycle and the time lapse between expirations and settlements can be a significant factor, particularly in the non-commercial sector.

Size of Base Rate Increases Reported[5]

The observed difference in reported base rate increases between COLA and Non-COLA agreements was one reason for undertaking the evaluation and quantification of COLA clauses. In the manufacturing sector, in particular, where the incidence of COLA clauses is substantial, reported base rate increases for COLA contracts are significantly smaller than Non-COLA ones.

The magnitude of the problem is seen in Table 4 below. The difference in reported increases in base rates between COLA and Non-COLA agreements ranges from 2.7 to 4.4 percentage points in the manufacturing sector and amounts to 0.9 to 1.2 percentage points for all agreements reported in 1978-79.

Without the quantification of COLA clauses at a given inflation rate, one could assume that wage increases in COLA agreements would at least equal those negotiated in the Non-COLA agreements. Many analysts have in fact focused on the latter figure, given that the aggregate number is biased downward by the presence of COLA agreements. Ideally, one would like to compare wage increases including COLA payments generated at the relevant inflation rate.

[5]Use is made here of base rate increases reported by the Labour Data Branch, Labour Canada.

Table 4

Major Wage Settlements Reported, 1978-79
Reported Base Rate Increases
COLA/Non-COLA Agreements

	Average Annual Percent Change					
	COLA Agreements		Non-COLA Agreements		Differences in Percentage Points	
	1978	1979	1978	1979	1978	1979
All Agreements	6.2	7.5	7.1	8.7	0.9	1.2
Non-commercial	6.9	8.4	6.7	8.2	0.2	0.2
Total Commercial	5.8	7.3	7.6	9.4	1.8	2.1
Manufacturing	5.0	5.5	7.7	9.9	2.7	4.4
Other Commercial	6.7	8.2	7.6	9.1	0.9	0.9

Type of Negotiated Increases in COLA Agreements

A brief review of this factor is necessary to highlight the prevalence of different types of wages increases and their implications for the internal wage structure of a bargaining unit.

The following types of wage increases were considered:

(1) Percent Across-the-Board Increases (Percent ATB)

Giving an equal percentage wage change to all wage levels in the bargaining unit thus maintaining internal wage relativities.

(2) Cents Across-the-Board Increases (Cents ATB)

Giving an equal dollar amount irrespective of wage levels, resulting in larger percentage increases for employees at the lower end of the wage schedule. Without adjustment this leads to a narrowing of wage differentials.

(3) Combined Percent and Cents Across-the-Board Increases (Percent and Cents ATB)

Depending on the nature of this combination within each wage schedule, the effect on wage relativities will lie between the extremes of (1) and (2).

Based on the wage settlements with COLA reported during 1978-79, it appears that "Cents ATB" and "Percent ATB" are the most common types of wage adjustments. In the commercial sector over one half

of COLA agreements use the "Cents ATB" type adjustment. However, in the non-commercial sector more than two thirds of COLA agreements have "Percent ATB" wage adjustments. The consequences for internal wage relativities are immediately apparent. In the commercial sector, the prevalence of "Cents ATB" wage increments induces changes in the bargaining units' wage relativities if not offset by special wage adjustments. The predominant use of "Percent ATB" wage adjustments in the non-commercial sector implies stable wage relativities.

C. Characteristics of COLA Clauses

It was noted earlier that COLA agreements are, on average, of longer duration, cover larger bargaining units and carry lower base-rate increases than Non-COLA agreements. But, since COLA clauses are negotiated as a means of protecting wages from increases in the "cost-of-living", there is a need to assess their contribution to wage change. The degree of protection offered by these clauses depends largely on a number of factors, of which two, the COLA formula and restrictions placed upon it, will be discussed below.

COLA Formula

The majority of COLA clauses are index related; that is they incorporate a formula specifying the relationship that is to exist between absolute or percentage changes in the CPI and the resulting COLA payments. Less frequent are "flat rate" COLA payments which are not formally linked to a change in the price level. The "flat rate" COLAs recognize that inflation will have an impact on wages during the life of an agreement and certain monies or wage increases are explicitly designated as compensation for inflation.

COLA formulae can be classified into four categories:

(1) "Cents per Index Point" (¢ per point)

This type of COLA formula links COLA payments to absolute increases in the index (e.g., one cent an hour for each 0.3 index point increase in the CPI). Therefore, the yield of a given formula is affected by the base period of the index (1961=100 versus 1971=100) as well as the index level. This formula generates absolute COLA payments that are wage level independent.

(2) "Cents per Percent Increase in the Index" (¢ per %)

This formula provides a specified absolute COLA payment for a given percentage point increase in the index (e.g., 5 cents an hour for each one percent increase in the CPI). While unaffected by the base period or level of the index, this formula, like the "¢ per point" formula, generates COLA payments that are wage level independent.

(3) "Percent Wage Change per Percent Increase in the Index" (% per %)

The "percent per percent" formula generates COLA payments in proportion to the rate of change in the index. If unrestricted, it fully protects wages against erosion by inflation. It has the added feature of maintaining relative wages within the bargaining unit, since COLA payments are wage-level dependent.

(4) "Other Types" of COLA Formulae

This category includes "flat rate" COLAs as well as other clauses, not easily classifiable, which link COLA payments to increases in the "cost-of-living".

The incidence of these various COLA formulae is not uniform as can be seen below in Table 5. There is a clear preference for the "¢ per point" and "% per %" formulae, with the "¢ per point" formula being most popular overall. Generally, the "¢ per point" formula accounts for approximately 55 to 66 percent of COLA agreements and employees while the "% per %" accounts for most of the rest. For the year 1980, these proportions are reversed due to a concentration of settlements reported during the first two quarters of 1980 which specify "% per %" COLA formulae.

The sectoral distribution of various COLA formulae varies considerably. In the commercial sector, roughly 50 percent of COLA agreements and employees use the "¢ per point" formula[6], while in the non-commercial sector, the "% per %" formula dominates 50 to 94 percent of COLA agreements covering about 90 percent of employees. The sectoral differences, as we shall see below, have implications for the wage structure of particular sectors and bargaining units.

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[6]In fact, 90 percent of COLA agreements in manufacturing, as well as employees, are covered by this type of formula.

Table 5

Major Wage Settlements with COLA
Breakdown of Formula Type
All Agreements

Formula Type	Number of Agreements			Number of Employees(000)		
	1978	1979	1980	1978	1979	1980
¢ Per Index Point	77	102	71	126.6	289.3	120.9
	(58.8)	(65.8)	(38.8)	(54.7)	(66.5)	(22.8)
% Per %	49	36	95	96.2	125.3	382.1
	(37.4)	(23.2)	(51.9)	(41.5)	(28.8)	(72.0)
¢ Per %	1	15	5	0.9	18.9	4.8
	(0.8)	(9.7)	(2.7)	(0.4)	(4.4)	(0.9)
Other	4	2	12	7.6	1.7	23.3
	(3.1)	(1.3)	(6.6)	(3.3)	(0.4)	(4.4)
Total COLA Agreements	131	155	183	231.3	435.2	531.0
	(100)	(100)	(100)	(100)	(100)	(100)

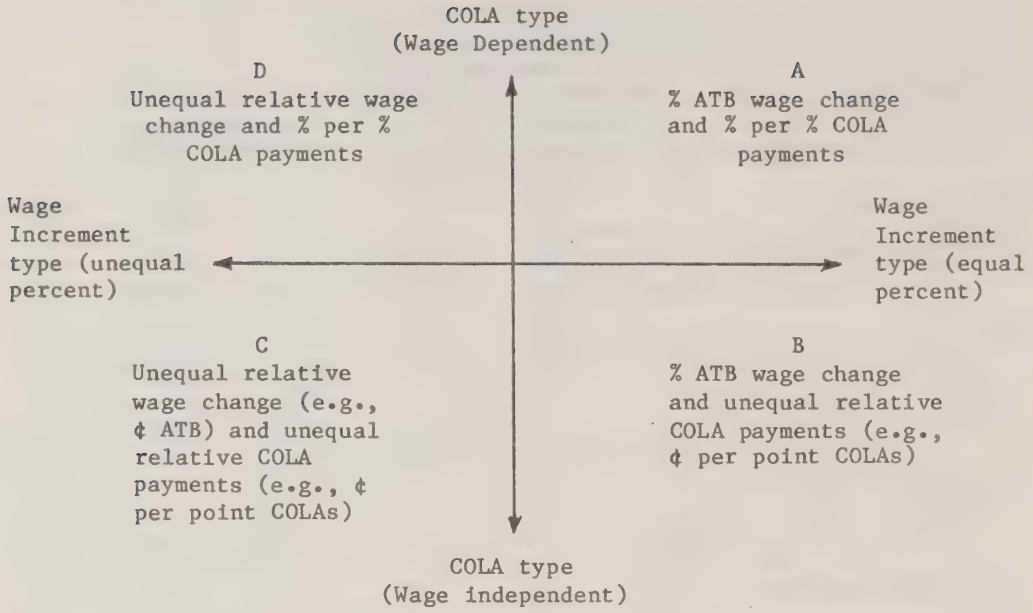
Note: Percentage Distribution in Brackets

Impact on Wage Differentials

The various COLA formulae defined above, have implications for the wage structure of the bargaining unit. Some leave wage relativities intact, while others influence wage differentials. On the one hand, wage-dependent COLAs generate an equal relative amount of money at each wage level, therefore leaving wage relativities unaffected (e.g., "% per %"). On the other hand, wage-independent COLAs generate a single amount payable to employees at all wage levels, therefore narrowing wage differentials (e.g., "¢ per point" or "¢ per %").

Whether the wage structure expands, contracts or remains the same, depends not only upon the nature of the COLA formula, but also upon the type of wage increases negotiated. This factor was already mentioned in Section B (see page 8). Equal percentage increments are "Percent ATB". All wages in effect at a certain date are increased by the same relative amount, therefore leaving relative wages unaffected. Unequal percentage increments are any wage increases or money payments which result in unequal percent increments to various wage levels. These include equal "Cents ATB" increments, special skill adjustments and job class adjustments.

Diagram 1



The relative impact on the wage structure is illustrated in Diagram 1. It combines wage increment and COLA formula types. Wage differentials will not change when equal percentage wage increases are combined with wage dependent (% per %) COLAs (quadrant A). Differentials will exhibit most change in cases where unequal wage increments (e.g., Cents ATB) are combined with wage independent (e.g., ¢ per point) COLAs (quadrant C). Results lie between the two extremes in quadrants B and D, which depict various combinations of equal and unequal relative change in the wage components.

Restricted Versus Unrestricted COLA Formulae

The actual yield of a COLA clause, although dependent on the type of COLA formula, is in large part determined by the presence of restrictions which in one way or another limit the amount of COLA payments generated. Three types of restrictions are particularly important:

(1) "Triggers"

Most triggers render the COLA formula inoperative until such time as the index reaches a pre-determined level. The "trigger" can therefore be stated as an absolute or percentage increase over the base period CPI (e.g., no COLA shall be paid until the CPI increases by 7 percent from a specified base period value).

(2) "Caps"

This type of restriction places a maximum on the amount that a COLA formula can generate. The maximum can be stated as an absolute dollar amount, as a percentage of wages, or as a percent movement of the CPI (e.g., one cent an hour will be paid for each 0.3 index point increase in the CPI up to a maximum of $0.20 an hour).

(3) "Inoperative Period"

The "inoperative period" simply implies that the COLA formula is inoperative for a given period during the agreement (e.g., no COLA payments during the first year of the agreement).

It is important to note that these restrictions are not mutually exclusive. That is, the presence of one type does not exclude the presence of another. For example, during 1978-79, close to 30 percent of COLA agreements covering 20 percent of employees contained more than one type of restriction. However, 30 percent of COLA agreements covering 40 percent of employees had no restrictions whatsoever. These proportions change significantly for specific sectors. In manufacturing, for example, 43 percent of COLA agreements covering 60 percent of employees have no restrictions, whereas in the non-commercial sector the proportions are 11 and 30 percent, respectively. In addition, "¢ per index point" COLA formulae generally have fewer restrictions than "% per %" formulae.

III - METHOD OF EVALUATION AND QUANTIFICATION - AND EXAMPLES

Each COLA clause is unique, reflecting the perceptions and compromises of the bargaining parties. In addition to the size of directly negotiated wage increments and the timing of these increases, the parties will also strike a bargain with respect to the characteristics of the COLA formula and the restrictions placed upon it. The complexities of COLA formulae and restrictions, therefore, must be evaluated in order to estimate, as accurately as possible, wage increases, inclusive of COLA payments generated, using either projected or actual inflation rates. It is the purpose of this section, to illustrate by means of examples, the method of evaluation and quantification and related matters. First, however, a few definitions and concepts are given to set the stage for subsequent analysis and interpretation.

A. Definitions and Concepts

As alluded to earlier (see p. 9), a Cost-of-Living-Adjustment (COLA) is defined for our purpose as any payment intended to protect wages from erosion by inflation. It includes not only COLA payments generated by movements in a price index, but also atypical "flat rate" payments[7]. In cases of doubt, contract wording and context were examined to clarify the intent of the bargaining parties. For example, a "supplementary payment" is not considered COLA unless the contract wording clearly indicates that its purpose is to offset inflation.

For the estimates of wage increases at selected inflation rates, the CPI was projected so as to capture COLA generation relevant to the contract term. "Inoperative periods", either late start or termination prior to expiration are accounted for, as well. Because the objective is also to capture COLA payments using the actual inflation experience, contract specific prices indexes are being used. In this regard, the Statistics Canada All Items CPI, with base period 1961 and 1971, is frequently specified. A number of contracts use Statistics Canada regional, or, city CPI's and combinations thereof. For collective agreements in the automotive industry, a weighted US/Canada CPI is applied.

Since the objective was to measure all specified wage increases, including those stemming from past and current COLA clauses, the wage concept had to be defined accordingly. Therefore, the Effective Wage Rate consists of any past COLA fold-ins or floats plus current COLA payments generated plus current wage increments negotiated. The

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[7]Example: "A Cost-of-living bonus of 15¢ per hour will be paid to all employees for the duration of this contract." The incidence of this COLA type is relatively small, see Table 5, p. 11.

Negotiated Wage Rate refers to the Effective Wage Rate minus all current COLA payments generated.[8] In this way, we can relate Effective Wages to Negotiated Wages, calculate rates of change accounting for "pure" wage increments, and current COLA payments generated at any time in the contract term.

The concept of current COLA payments generated requires further explanation. In some cases, COLA payments are determined by CPI movements outside the current contract term. For example, assume a contract to be effective from January 1, 1978 to December 31, 1979. The COLA clause may state that the first COLA payment, due January 1, 1978, is determined by the change in the CPI between December 1976 and December 1977. Similarly, the next payment, due January 1, 1979, results from the index change occurring between December 1977-78. Even though the contract term spans 1978-79, the COLA paid is related to the CPI movement in the period from December 1976 to December 1978.

B. Examples of COLA Quantification

The following examples illustrate the calculation and assessment of COLA assuming steady inflation rates of 6, 8 and 10 percent per annum over the contract term. The implications of this assumption should be stressed. A steady inflation rate implies there is absolutely no variation in that rate over the term of the contract in question. In reality, we know this to be false. For example, during the year 1979, the rate of inflation varied (on a monthly basis) from 8.1 to 9.8 percent per annum with an average of 9.1 percent. The actual amount of COLA generated may, therefore, differ from that estimated using steady rates. The 6, 8 and 10 percent inflation rates were chosen in order to give a "snapshot" of COLA effects over the range of inflation rates relevant to the operation of most formulae during the three years analyzed. The 8 to 10 percent range approximated inflation rates over the period and the 6 to 8 percent range approximated levels where many formulae become operative[9].

Example 1: "Cents-Per-Index Point"

One cent COLA is to be paid for every 0.30 index point increase in the level of the CPI (1971=100) after a 7 percent increase over the base month of January, 1979. COLA is to be calculated and paid quarterly according to the following pattern:

- April 1979 CPI compared to January 1979 CPI, adjusted for the 7 percent trigger, and paid commencing April

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[8]This concept differs from that used by the Labour Data Branch. The reported wage increases are not comparable to Negotiated increases since they include some aspects of current COLA. Effective Wage increases also differ since EAB's definition accounts for all past and current COLA floats which are excluded by the Labour Data Branch.

[9]Refer to Section IV (p. 30) for a brief discussion of results with higher inflation rates.

- July 1979 compared to April 1979 and paid commencing July

- October 1979 compared to July 1979 and paid commencing October

- January 1980 compared to October 1979 and paid commencing January 1980

The base-month CPI (January 1979, Canada All Items index published by Statistics Canada) is 182.7. The trigger is 7 percent. Therefore, the trigger CPI level is (1.07 X 182.7) or 195.5 10.

In order to estimate the amount of COLA payable, the base-month CPI is projected forward at the selected rates of inflation to the relevant calculation month. If the projected CPI level exceeds the trigger CPI, then COLA is payable at the rate of one cent for every 0.3 index point increase in the CPI, The projected CPI values at selected inflation rates are shown in Table 6-A 11. No COLA will be generated by this clause at 6 percent inflation since the trigger value of 195.5 exceeds the January 1980 figure of 193.7. At 8 percent inflation, the January 1980 projected CPI (197.3) exceeds the trigger value (195.5) by 1.8 index points. Since one cent is payable for every 0.3 index point rise, then six cents are payable to all employees at this inflation rate. At 10 percent inflation, the October 1979 projected CPI (196.2) exceeds the trigger (195.5) by 0.7 index points. Therefore, two cents COLA are payable commencing October 1979. The January 1980 CPI exceeds the October value by 4.8 index points, generating 16 cents COLA for the October/January period. The total COLA payable commencing January 1980 is 16 cents calculated for the October/January period, plus the two cents calculated for the previous quarter.

Suppose employees had an effective previous wage rate of $7.00 and also negotiated a wage increase of say, 50 cents. How then can wage-plus-COLA increases at different rates of inflation be assessed?

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[10] An example of a typical COLA clause using contract language is contained in Appendix 3.

[11] The projection formula for month t is $\left(1 + \frac{r}{100}\right)^{\frac{t}{12}} \times CPI_b$
where r is the rate of inflation
CPI_b is the Base-month CPI value

Table 6-A

Selected CPI Projections
And Cola Generated

	Base-Month CPI = 182.7		
	6% CPI	8% CPI	10% CPI
April 1979	185.4	186.2	187.1
July 1979	188.1	189.9	191.6
October 1979	190.9	193.6	196.2
January 1980	193.7	197.3	201.0
Cumulative COLA Generated	Nil	6 cents	18 cents

Table 6-B

Effective Wage Levels and Wage Increases

Inflation Rate	Effective Previous Wage Rate	Final Effective Wage (incl. COLA)	Effective Wage Increase
6 percent	$7.00	$7.50 (Nil)	7.14%
8 percent	$7.00	$7.56 (.06)	8.00%
10 percent	$7.00	$7.68 (.18)	9.71%

Table 6-C

Effective Nominal and Real Wage Increases

Inflation Rate	Effective Nominal Wage Increase (incl. COLA)	Effective Real Wage Increase (incl. COLA)
6 percent	7.14%	1.08%
8 percent	8.00%	0.00%
10 percent	9.71%	- 0.26%

There are two possible approaches. The first is to measure the effective nominal percentage wage-plus-COLA increases at each inflation rate as shown in Table 6-B[12]. It is apparent that employees at this wage rate are better off at a 6 percent inflation rate (even though no COLA is generated) because the effective negotiated increase of 7.14 percent more than compensates for the rate of inflation. At 8 percent inflation, the amount of COLA generated coupled with the negotiated increase is just enough to match the inflation rate; and at 10 percent inflation, the COLA payment of 18 cents is not enough to keep abreast of the inflation rate.

The second approach is to calculate the real wage increase by deflating the effective nominal wage-plus-COLA increase by the rate of inflation (e.g. (1.0714 ÷ 1.06)-1)x100). A comparison of effective nominal and real wage increases is shown in Table 6-C. The change in the real wage position is now clear. This particular wage and COLA package is obviously more advantageous to the employee at an inflation rate of 6 percent than at any higher rate. In fact, the deterioration in wages at 10 percent inflation amounts to about one quarter of 1 percent per annum.

Example 2: "Percent-per-Percent" Formula

In contrast to the "cents-per-point" formula discussed above, the "percent-per-percent" formula generates variable COLA payments for each wage level at any given inflation rate.

Suppose COLA to be paid is equal to the annual percent rise in the CPI in excess of 7 percent and applied to wages in effect over the period. COLA is then calculated by applying the difference between the inflation rate and the trigger to the wage rate in effect at the time. Assuming an effective previous wage of $7.00 and a negotiated increment of 50 cents at the start of the contract, results are as shown in Table 7-A. As before, no COLA is generated at 6 percent inflation since the inflation rate does not exceed the trigger of 7 percent. However, at 8 and 10 percent inflation rates, more COLA is generated than with the "cents-per-point" formula. Moreover, the resultant real wage position with COLA is superior and does not deteriorate relatively speaking with rising inflation as can be seen in Table 7-B.

Table 7-A

Effective Wage Levels and Wage Increases

Inflation Rate	Effective Previous Wage Rate	Final Effective Wage (incl. COLA)	Effective Wage Increase
6 percent	$7.00	$7.50 (nil)	7.14%
8 percent	$7.00	7.57 (.07)	8.14%
10 percent	$7.00	7.71 (.21)	10.14%

[12]For some notes on conventional and time-weighted methods of measuring rates of increase, consult Appendix 4.

Table 7-B

Effective Nominal and Real Wage Increases

Inflation Rate	Effective Nominal Wage Increase (incl. COLA)	Effective Real Wage Increase (incl. COLA)
6 percent	7.14%	1.08%
8 percent	8.14%	0.13%
10 percent	10.14%	0.13%

In general, "percent-per-percent" formulae when triggered will generate enough COLA to maintain a constant real wage level across all inflation rates. An additional advantage is that these formulae maintain relative real wage positions across all wage levels in the bargaining unit. This is discussed in more detail in the following section on Low, Mid and High rates.

C. Low, Mid and High Wage Rates - Nominal and Real Increases

Current wage reporting by the Labour Data Branch of Labour Canada relies on a representative rate chosen for each bargaining unit called the base rate. It is defined as the rate applicable to the lowest paid classification of qualified workers in the bargaining unit. For example, in an industrial bargaining unit composed of say, janitors, labourers, supervisors, and electricians, the base rate could well be the rate paid to labourers. The wage increases applicable to labourers then become "representative" increases for the entire bargaining unit.

Whether or not base rate increases are "representative" for the entire bargaining unit is an empirical question. For our analysis, it was necessary to gain an appreciation of how much effective wage increases (including COLA payments) differed at selected wage levels in the bargaining unit. Two factors, a priori, suggest a narrowing of wage differentials: "Cents-Across-the-Board Wage Increments" and "Cents Per Index Point" COLA formulae. It is, therefore, important to measure negotiated and effective wage increases at selected wage levels because of collective bargaining and economic ramifications. If wage differentials are affected, it may increase the incidence of skill differential payments, job-class-increment adjustments, and reclassification demands in future bargaining rounds.[13] In addition, deteriorating relative wage positions may lead to increased mobility as skilled workers seek better pay in other firms, or to reduced productivity as unskilled workers wages rise relative to those of skilled workers.

[13]For some views of union officials on the relative merits of COLA clauses and their consequences for wage differentials see "Industrial Relations 1980: Outlook and Issues" Executive Bulletin No. 10, January 1980 and "Industrial Relations 1981: Outlook and Issues", Executive Bulletin No. 14, February 1981, Compensation Research Centre, The Conference Board in Canada.

The measurement of wage differentials requires a consistent set of wage rates selected from the wage schedule of each bargaining unit. Three wage rates were chosen from a given base period wage schedule and defined as follows:

> The Low Rate is the starting rate of the lowest-paid permanent classification of workers in the bargaining unit.
>
> The High Rate is the starting rate of the highest-paid permanent classification of workers in the bargaining unit.
>
> The Mid Rate is the starting rate of the permanent classification closest to the High/Low mean.

The base period wage schedule for any bargaining unit is the wage schedule applicable to the last day of the agreement prior to the 1978 settlement.[14] The chosen rates (and their associated classifications) can then be traced through time from agreement to agreement in order to observe relative wage movements and analyze adjustments made. Permanent classifications are used because the hourly wage payable to permanent employees implies a conceptually consistent mix of monetary and non-monetary benefits in any bargaining unit. (For example, part-time employees are often paid a sum of money in place of certain non-monetary fringe benefits enjoyed by their full-time counterparts.) Starting rates are used as the analysis focuses on relative changes between classifications, not between increment levels within classifications. In sum, by analyzing the effects of negotiated increments and COLA payments on a set of wage rates within the bargaining unit, we are able to obtain figures suitable for comparison and analysis of wage differentials over time.

The following example illustrates the nature of relative wage change (including COLA payments) induced by the collective bargaining process.

The bargaining unit consists of janitors, labourers, supervisors, and electricians. A 50 cent across-the-board wage increment was negotiated and a wage independent COLA formula (see Example 1, p.15.) specified: "1¢ COLA payable for every 0.3 point increase in the CPI, triggered at 7 percent from the January 1979 level (1971=100)." It will be recalled that due to the trigger no COLA was generated at 6 percent inflation; 6 cents were payable at 8 percent, and 18 cents were payable at 10 percent inflation. The effective wage levels and nominal and real wage increases at selected inflation rates are shown in Tables 8-A and 8-B.

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[14] Or first settlement after 1978, if no settlement was reached in that year.

Table 8-A

Effective Wage Levels, At Selected Inflation Rates

	Effective Previous Wage	Final Effective Wage (incl. COLA) at CPI of		
		6%	8%	10%
Janitor	$6.00	$6.50	$6.56	$6.68
Labourer	7.00	7.50	7.56	7.68
Supervisor	8.00	8.50	8.56	8.68
Electrician	10.00	10.50	10.56	10.68

Table 8-B

Nominal and Real Effective Wage Increases (Incl. COLA)
At Selected Inflation Rates

	6%		8%		10%	
	Nom.	Real	Nom.	Real	Nom.	Real
	%	%	%	%	%	%
Janitor	8.3	2.2	9.3	1.2	11.3	1.2
Labourer	7.1	1.1	8.0	0.0	9.7	-0.3
Supervisor	6.3	0.2	7.0	-0.9	8.5	-1.4
Electrician	5.0	-0.9	5.6	-2.2	6.8	-2.9

Wage levels are being compressed due to the nature of the wage increment (50 cents ATB) and "cents per point" COLA clause. Both nominal and real wage increases, therefore, show sizeable differentials favouring the lower-paid categories in the bargaining unit.

D. The Wage Indexation Factor (WIF) and Other Elasticity Measures

Previously, the discussion of COLA payments was approached in terms of nominal and real increases including COLA. It was shown how different types of COLA formulae affect the employee's wage position relative to his co-workers as well as to inflation. The next task is to examine the quality of the clause itself and how well it protects wages against erosion by inflation.

The Wage Indexation Factor (WIF) estimates this quality at selected rates of inflation by comparing the final effective wage level (including COLA) with the final negotiated wage level (which excludes current COLA). It measures the response of the COLA component of wages to price-level movements.[15]

By way of illustrating the calculation of WIF, consider the previous example of a cents-per-point COLA formula which generated 18 cents COLA at a 10 percent inflation rate. The final effective wage level for the labourer in this example was $7.68, and the final negotiated level excluding COLA was $7.50. Dividing these two values to estimate percent growth of wages due to COLA at 10 percent inflation, gives 2.4 percent. This in turn, is divided by the rate of inflation resulting in a WIF of 0.24 [16].

WIF is meaningful as a relative measure. The "ideal" level of wage protection would be characterized by a WIF value of unity. This means that the COLA formula generates enough to fully protect negotiated increases from erosion by inflation. On the other hand, a WIF value of zero implies no protection. (This would occur when the rate of inflation is lower than the trigger specified in the formula -- a 6 percent inflation rate in the above example.) Seen in this light, the calculated WIF of 0.24 indicates that the COLA formula generates approximately one quarter of the amount required to fully protect the negotiated increase of 50 cents from erosion by the 10 percent rate of inflation.

WIF can be used to compare wage protection across inflation rates. In the same example, the WIF is zero at 6 percent inflation, 0.10 at 8 percent, and 0.24 at 10 percent. Clearly, the quality of this particular clause improves with rising inflation. In other words, more COLA is generated relative to the negotiated increase as inflation increases.

Quality improvement, however, does not imply an equivalent response in the total wage-plus-COLA package with respect to the rate of inflation. Table 9-A summarizes the situation. As the WIF increases, the real wage position deteriorates. Clearly, even though the formula is generating more COLA relative to the negotiated increase as inflation rises, it is not enough to prevent overall deterioration of the total wage-plus-COLA package with respect to the inflation rate.

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[15] WIF is calculated by dividing the average annual percent growth in the COLA wage component by the rate of inflation. See Appendix 5 for details of the WIF formula.

[16] $\left(\frac{\$7.68}{\$7.50} - 1\right) \times 100) \div 10 = 0.24$

Table 9-A

Effective Nominal, Real Wage Change and WIF

Inflation Rate	Effective Nominal Wage Change (incl. COLA)	Effective Real Wage Change (incl. COLA)	WIF
6%	7.14%	1.08%	0
8%	8.00%	0.00%	.10
10%	9.71%	-0.26%	.24

Table 9-B

Effective Real Wage Change and WIF at Selected Inflation Rates

	$\dot{P}$ = 6%		$\dot{P}$ = 8%		$\dot{P}$ = 10%	
Wage Classification	Real Wage % (incl.COLA)	WIF	Real Wage % (incl.COLA)	WIF	Real Wage % (incl.COLA)	WIF
Janitor	2.2	0	1.2	.12	1.2	.28
Labourer	1.1	0	0.0	.10	-0.3	.24
Supervisor	0.2	0	-0.9	.09	-1.4	.21
Electrician	-0.9	0	-2.2	.07	-2.9	.17

By adding information on low, mid and high rates (Table 9-B), we can see the effects of the COLA clause on various wage levels within the bargaining unit across the selected inflation rates. In addition to conclusions reached previously concerning a single wage classification, it is evident that COLA quality decreases with rising wage levels.

The pattern of COLA response to wage level/inflation rate changes will vary with the particular wage-plus-COLA package negotiated. When a percent-per-percent COLA formula is negotiated along with a percent across-the-board increase, each employee will receive the same relative COLA protection at any inflation rate no matter what his wage level. He also will receive the same relative wage-plus-COLA increase as his fellow workers. As in the previous example, more COLA will be generated in absolute terms relative to the negotiated increase as the rate of inflation rises.[17]

[17]Note that this COLA clause is triggered at 7 percent. A percent-per-percent formula with no trigger or other restrictions will produce the "ideal" WIF value of unity.

WIF is not the only measure of COLA response or quality. Another estimates COLA response from a specific wage level, such as the previous one. This approach ignores current negotiated increments and is in this sense more restrictive in application than WIF. In fact, it represents a special case of WIF where there are no negotiated increases.[18] Another measure estimates COLA response to changes in the rate of inflation (as opposed to changes in the price level at a given rate of inflation captured by WIF). The alternative measure shows the formula response to a sudden jump in the inflation rate -- say from 8 percent to 10 percent in one month. WIF, of course, assumes a steady rate of inflation throughout. These alternate measures are discussed in more detail in Appendix 5.

[18]This measure is used by David A. Wilton in "An Analysis of Canadian Wage Contracts with Cost of Living Clauses," Economic Council of Canada, Discussion Paper No. 165, March 1980.

IV - ESTIMATES OF EFFECTIVE WAGE INCREASES IN COLA AGREEMENTS AT SELECTED INFLATION RATES

Having set out the method of evaluation and quantification of COLA clauses in the previous section, we are now in a position to review the estimates of effective wage increases at selected inflation rates. In order to focus our discussion in the text below, we have limited ourselves to the commercial sector. Tables 11 to 14, at the end of this section, give annual and quarterly details of our estimates of effective wage increases in COLA agreements at selected inflation rates by various levels of aggregation. Immediately below, we proceed with a discussion of the estimates in the context of the definitions and concepts elaborated in section III. This includes data on the size distribution of the Wage Indexation Factor (WIF) and its relationship to negotiated wage increases. In the subsection which follows, we examine the consequences for wage compression using Low, Mid and High wage rates. Lastly, we discuss the responsiveness of effective wage increases over a greater range of inflation rates providing estimates of COLA elasticities.

A. Estimated Effective Base Increases and Related Data

As mentioned previously, the analysis of COLA requires an appropriate definition of the wage concepts involved. Effective increases include all elements of current and past COLA as well as predetermined negotiated increments. Negotiated increases on the other hand, exclude current COLA.[19] Wage increases are estimated from the previous effective wage level which includes all past COLA generated. By separating wage components in this way, the relationship of current COLA to wage increases can be examined and the COLA quality assessed. The ultimate objective is to measure the effective wage contractually specified and received by the members of the bargaining unit at a given wage and classification level.

Chart 2 depicts these relationships for the commercial sector for settlements reported during the years 1978 to 1980 using the base rate. The left panel in Chart 2 shows the relationship between negotiated, reported and effective wage increases at 8 and 10 percent inflation. As expected, the estimated effective increases at the two inflation rates exceed the negotiated one; the difference being due to the generation of COLA payments. Negotiated base rate increases of major wage settlements with COLA clauses accelerated from 5.5 percent in 1978 to 8.2 percent in 1980. Assuming a steady inflation rate of 10 percent over contract life, effective increases are estimated to amount to 10.4 percent for COLA settlements reported in 1978 and

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[19] Both wage concepts differ from reported increases (see p. 15). It should also be noted that a number of agreements reported in 1980 (in the Non-Commercial Sector) adjusted their wage schedules assuming a certain rate of inflation. For consistent analysis, these wage schedules were readjusted to permit the application of our estimation procedure.

11.3 percent for settlements reported in 1980.[20] The changing absolute difference between negotiated and effective increases reflects the average "richness" of COLA agreements reported. This is also apparent with reference to the average WIFs, which capture the yield of COLA clauses in relation to negotiated increases (see Chart 2, bottom right panel). It is evident that the quality of COLA clauses as measured by WIF declines as the negotiated wage component increases.

However, the fact that the average quality of COLA clauses is deteriorating does not necessarily indicate that employees are worse off with respect to inflation. COLA payments must be assessed in the context of the total wage package and related to the rate of inflation. A glance at the top right panel of Chart 2 indicates this is indeed the case. Our estimates suggest that effective real wage increases (at the respective base rate levels) would be positive if the assumed rates of inflation would prevail over the life of contracts. From the size of the real wage increases at 8 percent inflation it may be concluded that inflationary expectations in 1979 and 1980 were above this assumed rate.

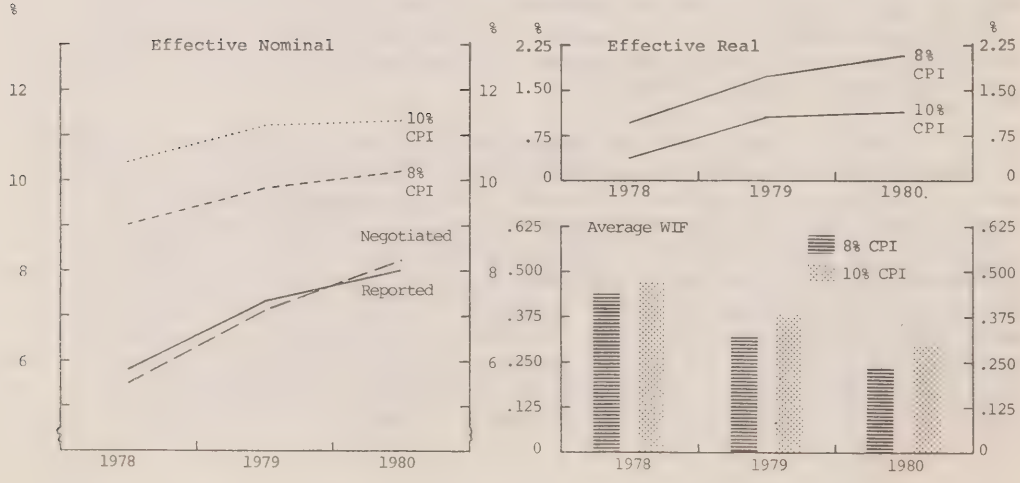
CHART 2

MAJOR WAGE SETTLEMENTS WITH COLA

ESTIMATED EFFECTIVE BASE RATE INCREASES AND RELATED DATA

TOTAL COMMERCIAL

Average Annual Compound %



[20] See Table 11 for further details on base rate increases.

WIF values appear to be inversely related to the size of negotiated increases. As negotiated increases in the Commercial sector rose from 5.5 percent in 1978 to 8.2 percent in 1980, WIF declined from 0.43 to 0.23. Table 10 provides some data on the relationship between the size of WIF and negotiated increases. WIF values are shown in size intervals of 0.2 as well as the corresponding negotiated increases and employee distribution.

Table 10

Major Settlements with COLA
WIF and Negotiated Increases
Commercial Sector 1980

WIF Intervals	Base Rate Negotiated	Employee Distribution
	%	%
0.00-0.19	9.95	54.5
0.20-0.39	7.98	22.9
0.40-0.59	7.35	4.1
0.60-0.79	3.76	10.9
0.80-0.99	3.47	6.9
1.00 and over	3.25	0.8

The first point to note is the existence of the expected relationship between WIF and the size of the negotiated increase. The lowest WIF interval (0.0-0.19) is characterized by the highest increase (9.95 percent). Conversely, high WIF values are associated with relatively low negotiated increases. The second point to note is that employee coverage is uneven. In fact, most employees (54.5 percent) have wage plus COLA packages characterized by relatively large predetermined (negotiated) increases and relatively small variable (COLA) components. This could indicate that most bargaining agents' expectations of the nature of future inflation contained a large stable component (covered by the predetermined increase of 9.95 percent) and a small variable component (WIF values under 0.2).

B. Estimated Effective Low, Mid and High Wage Rate Increases and Wage Compression

The examination of COLA effects on base rate increases in the Commercial sector gives a picture of what is happening to one wage level in the bargaining unit. However, particular combinations of wage increment types and COLA formula types have varying effects on different wage levels within the bargaining unit. In this analysis, the same wage concepts defined earlier also apply to the data on Low, Mid and High rates. Effective increases include all current and past COLA payments; negotiated exclude current COLAs. Wage schedules are readjusted where necessary and increases are calculated from the previous effective level.

Again, focusing on the Commercial sector, we see the expected variation in effective wage increases over the range of wage levels in the bargaining unit (see Table 12). In 1978, for instance, at an assumed inflation rate of 6 percent, the Low/High difference is 1.1 percentage points; at 10 percent inflation, it is 1.7 points. This difference is apparent in all years and is attributable to the prevalence of "Cents ATB" wage increases and wage independent COLA payments in this sector. (See page 12)[21]

Table 12 also displays wage change for Low, Mid and High rates related to the rate of inflation. It is evident that average real wage change is positive at all wage levels for settlements reported except at 8 and 10 percent inflation for the year 1978. This suggests that bargaining parties expected lower rates of inflation to prevail at the time of the 1978 settlements compared with those reported in 1980. In addition, increases for employees at the high wage rate are on average less that those at the low end indicating they are worse off relative to their fellow workers, as well as, in some instances, to the inflation rate itself. Note that estimates at the assumed inflation rate of 6 percent produce relatively high rates of real increase especially in the years 1979 and 1980. Clearly, this rate of inflation was too low an expected future inflation to the bargaining parties. Negotiated wage and COLA packages during those years would be more relevant at an inflation range of between 8 to 10 percent.

In the context of Low, Mid and High wage rates, the quality of the COLA clause as measured by the Wage Indexation Factor (WIF), can be examined in two ways: (a) by looking at variations in protection over different wage levels at a given inflation rate and (b) by examining protection of a given wage level over changing inflation rates. Table 12 in the Appendix summarizes information on average WIF values for settlements in all sectors for the years 1978 to 1980. Focusing on the Commercial sector, we see that at a given inflation rate, WIF values decrease as wage levels increase. This effect is due to the prevalence of wage independent COLA formulae in this sector. By paying the same COLA amount to each wage level, proportionately more protection is generated for lower wage levels.[22]

With regard to the second point above where protection of a given wage level varies over different inflation rates, we notice WIF values increase with increasing inflation. This indicates the average COLA formula generates increasing amounts of money relative to the negotiated increase as the inflation rate rises. This result is

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[21] By way of contrast, the Non-Commercial sector exhibits less variation because of the greater incidence of "Percent ATB" wage increases and wage dependent COLAs.

[22] WIF values in the Non-Commercial sector remained relatively constant at a given inflation rate due to the prevalence of wage dependent formulae in this sector.

primarily dependent upon the prevalence and value of triggers. For example, a trigger of 7 percent, say, generates a WIF of zero at 6 percent inflation; some positive value at 8 percent; and a greater positive value at 10 percent. Aggregation across contracts produces the results presented in Table 12. [23]

Wage and COLA payments can affect the relative position of different wage levels within the bargaining unit (see page 12). For example, a percent across the board (ATB) increase combined with a wage dependent COLA payout will not affect wage relativities. On the other hand, a cents ATB increase combined with a wage independent COLA payout will result in unequal percentage increases at different wage levels and in changing relative wage position. Looking at Commercial sector figures for 1980, we notice the percentage difference[24] between low and high effective increases at 6 percent inflation is 1.01 percent, whereas at 10 percent inflation, it is 1.27 percent. In other words, as the rate of inflation increases, the generation of COLA is such as to cause a widening gap between the size of low and high rate increases. This means that the difference between the average low and high increases at 10 percent inflation (11.6 percent and 10.2 percent, respectively) is relatively greater than their difference at 6 percent inflation (9.7 percent and 8.6 percent).[25]

C. Estimates of COLA Elasticities

The Wage Indexation Factor (WIF), discussed earlier, is one measure of COLA responsiveness to the rate of inflation. It measures how well the COLA clause protects negotiated wage increases against erosion by inflation. For some purposes, it may also be useful to measure COLA response in terms of the previous wage rate (CE_1). In addition, one may wish to capture the change in the effective wage increases (due to COLA) resulting from a change in the rate of inflation. The first two measure average COLA responsiveness (in relation to negotiated increases or the previous wage rate) at a given inflation rate. The latter measures the incremental effective wage increase stemming from a change in the rate of inflation. This measure of marginal wage response we identify as CE_2.

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[23] In the Non-Commercial sector for the years 1979 and 1980, WIF values remained relatively constant as inflation rose because of the prevalence of wage dependent unrestricted COLA formulae.

[24] Percentage difference calculated by comparing rates of increase.
e.g., 1978 Commercial $\left(\frac{1.078}{1.067} - 1\right) \times 100 = 1.03\%$

[25] There is little wage compression in the Non-Commercial sector for the years 1979 and 1980 due to the high concentration of percent ATB wage increases and wage dependent COLAs in those settlements.

For the derivation of CE_1 and CE_2 each inflation rate between 1 and 14 percent was regressed on the corresponding quarterly values of the effective wage increases obtained in the commercial sector in 1980. As will be shown through this approach, we can demonstrate the relationship between effective and negotiated wage increases and the inflation rate. The equation to be estimated is as follows:

$$\dot{W}_{Eff} = a_0 + a_1 (\dot{P} - \dot{R}) + a_2 (\dot{P} - \dot{R}) Z + u \qquad (1)$$

where,

$\dot{W}_{Eff}$ is effective wage increase

$\dot{P}$ is the inflation rate

$\dot{R}$ is that inflation rate at which the restrictions placed on the COLA clause are no longer operative

Z is a dummy variable equal to 0 when $\dot{P} \leq \dot{R}$ and otherwise equal to 1.

A priori one would expect that $a_0 - a_1 \dot{R}$ approximates the negotiated wage increase ($\dot{W}_{Neg}$). The parameters to be estimated then are a_0, a_1 and a_2.

In Chart 3, we plot the relationship of $\dot{W}_{Eff}$ to $\dot{P}$ ranging from 0 to 14 percent. A definite change in the slope is apparent at $\dot{P}$ between 6 and 8 percent. The dummy variable (Z) was introduced to capture this change in slope. To standardize the intercepts, the W_{Eff} axis was shifted to $\dot{R}$ which in this case was determined to be at $\dot{P}$ of 8 percent using as proxy for $\dot{R}$ value of $\dot{W}_{Neg}$. The estimated regression (t statistics in brackets) is given below.

$$\dot{W}_{Eff} = \underset{}{10.1} + \underset{(32.15)}{0.237} \underset{(3.36)}{(\dot{P} - 8)} + \underset{(2.33)}{0.323} (\dot{P} - 8) Z \qquad (1)$$

$$R^2 = 0.82$$

Rewriting this equation gives us the following:

$$\dot{W}_{Eff} = 8.2 - 2.58 Z + 0.237 \dot{P} + 0.323 \dot{P}Z \qquad (2)$$

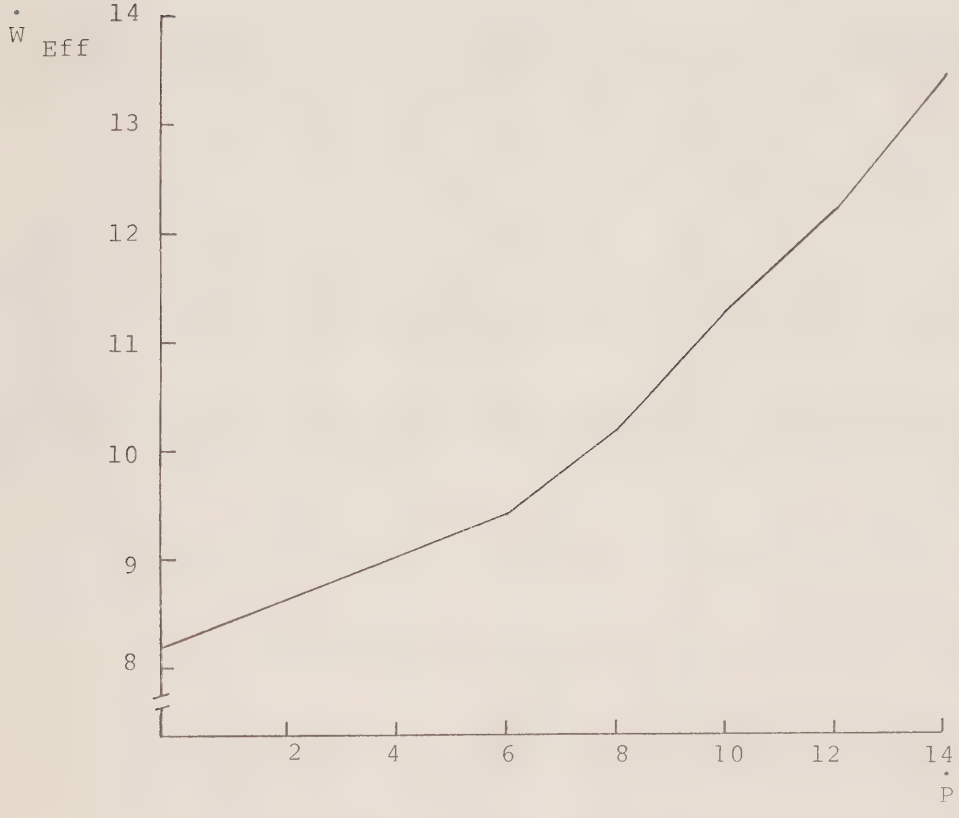
where $Z = \begin{cases} 0 \text{ if } \dot{P} \leq 8 \\ 1 \text{ otherwise} \end{cases}$

CHART 3

RELATIONSHIP BETWEEN EFFECTIVE

BASE-RATE INCREASES AND THE INFLATION RATE

COMMERCIAL SECTOR 1980



The regression results can now be analyzed intuitively. The constant of 8.2 reflects the level of effective wage increase at an inflation rate of zero percent, or put differently, it is the negotiated wage increase (see Table 11). To the negotiated wage increase is added COLA payments captured by the two price inflation coefficients.

The level of effective wage increase can then be easily estimated by placing the desired inflation rate into equation (2) and calculating the result. For example, at 10 percent inflation, the estimated effective wage increase would be

$$\dot{W}_{Eff} = 8.2 - 2.58(1) + 0.237(10) + 0.323(10) \quad (1)$$
$$= 11.2 \text{ percent}$$

The estimated 11.2 percent compares quite favourably with the figure of 11.3 percent given in Table 11.

Equation (2) can now be transformed to obtain various estimates of COLA clause quality for the Commercial sector in 1980. To obtain CE_1, the negotiated wage increase must be subtracted from both side of (2), and the result divided by the inflation rate ($\dot{P}$). We thus obtain

$$CE_1 = \frac{\dot{W}\ Eff - 8.2}{\dot{P}} = \frac{-2.58}{\dot{P}} + 0.237 + 0.323\ Z$$

So at 10 percent inflation, CE_1 would equal 0.3, which means that at a rate of inflation of 10 percent, the COLA clause generated on average a 0.3 percent increase in wages for each percent of inflation.

The final measure of COLA quality, CE_2, estimates the change in effective wage increases due to a change in the rate of inflation. By its definition, CE_2 is simply the derivative of equation (2) with respect to the inflation rate. That is,

$$CE_2 = \frac{d\ \dot{W}\ Eff}{d\dot{P}} = 0.237 + 0.323\ Z$$

and since the inflation rate was over 8 percent in 1980,

$$CE_2 = 0.237 + 0.323 = 0.56$$

This implies that each one percent increase in the inflation rate will be matched by a 0.56 percent increase in the Commercial sector's effective wage increase.

It is also possible to obtain WIF estimates from equation (2). However, since aggregate WIFs have already been given in previous sections, we did not feel the need to do so. The reader can, if he wishes, calculate these himself by transforming equation (2) so as to correspond to the WIF formula given in Appendix 5.

Table 11

Major Wage Settlements with COLA
Reported, Negotiated, and Estimated Effective Base Rate Increases
At Inflation Rates of 6, 8 and 10 Percent
Average Annual Compound %

				1978				1979				1980			
	1978	1979	1980	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
All Industries															
As Reported	6.2	7.5	8.8	6.0	6.8	5.4	6.6	5.4	8.0	9.0	6.9	8.8	9.0	9.4	8.1
Negotiated	5.8	6.6	4.8	5.2	6.5	5.1	6.2	5.1	7.9	9.4	4.0	1.9	7.5	9.8	7.2
At CPI's of 6%	7.7	8.7	8.1	7.0	7.7	7.9	7.8	8.8	9.1	10.3	7.5	6.7	9.1	10.8	9.4
8%	8.8	9.6	9.3	8.5	8.6	9.0	8.9	9.8	9.9	10.5	8.7	8.5	10.0	11.0	10.1
10%	10.3	11.0	10.8	10.3	10.2	10.2	10.4	10.7	11.5	11.7	10.2	10.3	11.3	11.7	11.2
Non-Commercial															
As Reported	6.9	8.4	9.3	5.6	7.2	6.6	7.8	6.4	6.8	7.1	9.2	9.1	10.1	10.2	9.2
Negotiated	6.4	4.0	2.6	3.9	7.1	7.1	6.5	6.4	6.9	7.6	2.6	0.8	7.0	9.6	5.4
At CPI's of 6%	7.3	7.4	7.3	6.3	7.6	8.0	7.4	6.7	7.0	8.7	7.4	6.5	8.9	10.4	8.5
8%	8.3	8.6	8.8	7.7	8.4	9.1	7.9	7.2	7.3	9.1	9.0	8.4	9.5	10.7	9.6
10%	10.0	10.1	10.5	9.5	10.3	10.8	8.9	8.3	8.6	9.9	10.7	10.3	10.9	11.8	10.7
Commercial															
As Reported	5.8	7.3	8.0	6.3	5.7	5.3	6.3	5.2	8.1	9.1	5.6	7.6	8.1	9.0	7.6
Negotiated	5.5	7.1	8.2	6.1	5.3	4.8	6.1	4.8	8.0	9.6	4.9	7.0	8.0	9.9	7.9
At CPI's of 6%	7.8	9.0	9.4	7.5	7.8	7.9	7.9	9.3	9.2	10.1	7.5	7.8	9.3	10.9	9.7
8%	9.0	9.8	10.2	9.0	8.9	9.0	9.2	10.5	10.0	10.7	8.5	8.8	10.4	11.1	10.3
10%	10.4	11.2	11.3	10.7	10.0	10.1	10.8	11.3	11.6	11.9	9.9	10.1	11.6	11.7	11.4
Of Which: Manufacturing															
As Reported	5.0	5.5	7.0	5.8	5.5	4.7	5.4	6.8	5.7	10.2	4.0	6.5	5.9	8.4	7.3
Negotiated	4.6	5.2	7.1	5.2	5.3	3.7	5.6	6.7	5.2	13.6	3.1	6.6	5.7	8.5	7.4
At CPI's of 6%	7.7	8.4	9.0	7.9	7.9	7.6	7.5	10.8	8.4	14.1	6.7	8.5	8.5	9.3	9.3
8%	8.8	9.6	9.7	8.8	9.1	8.9	8.3	12.2	9.8	14.4	7.9	9.2	9.6	9.5	10.0
10%	10.1	10.8	10.7	9.7	10.3	10.3	9.5	13.9	11.1	14.8	9.1	10.0	10.6	10.6	11.2

Source: Reported increases: Labour Data Branch, Labour Canada
Negotiated and Estimated Effective increases: EAB Research File, Labour Canada

Table 12

Major Wage Settlements with COLA
Estimated Effective and Real Wage Increases and WIFs
For Low, Mid and High Wage Rates At Selected Inflation Rates
Average Annual Compound %

	1978			1979			1980		
	Effect.	Real	WIF	Effect.	Real	WIF	Effect.	Real	WIF
All Industries									
At CPI of 6%									
Low	7.7	1.64	0.31	8.9	2.70	0.40	8.2	2.05	0.55
Mid	7.1	1.05	0.27	8.5	2.34	0.36	7.8	1.74	0.54
High	6.9	0.81	0.24	8.3	2.13	0.34	7.6	1.55	0.53
At CPI of 8%									
Low	8.9	0.81	0.37	9.9	1.73	0.42	9.5	1.35	0.57
Mid	8.1	0.08	0.32	9.4	1.29	0.38	9.1	1.02	0.56
High	7.7	-0.24	0.28	9.1	1.02	0.35	8.9	0.81	0.55
At CPI of 10%									
Low	10.4	0.40	0.44	11.3	1.17	0.46	10.9	0.84	0.60
Mid	9.4	-0.54	0.38	10.7	0.60	0.42	10.5	0.49	0.59
High	8.9	-0.98	0.34	10.3	0.25	0.39	10.3	0.26	0.58
Non-Commercial									
At CPI of 6%									
Low	7.7	1.60	0.15	7.4	1.30	0.55	7.2	1.10	0.79
Mid	7.1	0.99	0.15	7.3	1.20	0.54	7.0	0.95	0.79
High	7.1	1.02	0.15	7.1	1.05	0.53	7.0	0.95	0.79
At CPI of 8%									
Low	8.7	0.65	0.23	8.6	0.58	0.56	8.8	0.70	0.79
Mid	7.9	-0.07	0.22	8.5	0.45	0.55	8.6	0.55	0.79
High	7.9	-0.10	0.21	8.3	0.29	0.54	8.6	0.55	0.79
At CPI of 10%									
Low	10.5	0.45	0.35	10.1	0.12	0.59	10.5	0.44	0.80
Mid	9.4	-0.51	0.31	10.0	-0.04	0.58	10.3	0.29	0.80
High	9.3	-0.66	0.29	9.8	-0.23	0.57	10.3	0.29	0.80

Table 12 (continued)

	1978			1979			1980		
	Effect.	Real	WIF	Effect.	Real	WIF	Effect.	Real	WIF
Commercial									
At CPI of 6%									
Low	7.8	1.66	0.42	9.3	3.09	0.36	9.7	3.51	0.19
Mid	7.2	1.09	0.35	8.8	2.65	0.31	9.1	2.96	0.16
High	6.7	0.67	0.30	8.6	2.43	0.28	8.6	2.46	0.14
At CPI of 8%									
Low	9.0	0.92	0.46	10.2	2.05	0.38	10.5	2.34	0.24
Mid	9.2	0.18	0.38	9.6	1.52	0.33	9.9	1.74	0.21
High	7.6	-0.34	0.33	9.3	1.22	0.30	9.3	1.20	0.19
At CPI of 10%									
Low	10.4	0.37	0.50	11.6	1.46	0.43	11.6	1.44	0.29
Mid	9.4	-0.57	0.42	10.9	0.78	0.38	10.9	0.78	0.26
High	8.7	-1.19	0.37	10.4	0.38	0.34	10.2	0.20	0.24
Of Which: Manufacturing									
At CPI of 6%									
Low	7.9	1.78	0.53	9.2	3.06	0.56	9.2	2.99	0.29
Mid	7.2	1.13	0.45	8.5	2.38	0.47	8.9	2.74	0.25
High	6.7	0.70	0.38	8.1	1.95	0.41	8.5	2.40	0.22
At CPI of 8%									
Low	9.1	1.03	0.55	10.5	2.34	0.58	9.8	1.71	0.30
Mid	8.2	0.21	0.46	9.6	1.49	0.48	9.5	1.39	0.26
High	7.6	-0.36	0.39	9.0	0.95	0.42	9.1	0.99	0.23
At CPI of 10%									
Low	10.4	0.41	0.57	11.9	1.69	0.59	10.9	0.82	0.34
Mid	9.3	-0.60	0.47	10.8	0.69	0.50	10.5	0.42	0.30
High	8.6	-1.29	0.41	10.0	0.03	0.43	10.0	-0.04	0.27

Source: EAB Research File, Labour Canada

Table 13

Major Wage Settlements with COLA
Low, Mid and High Wage Rates
Estimated Effective Increases at Inflation Rates of 6, 8 and 10 Percent
Average Annual Compound %

				1978				1979				1980			
	1978	1979	1980	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
All Industries															
At CPI of 6%															
Low	7.7	8.9	8.2	7.2	8.1	7.7	7.6	8.8	8.9	10.4	7.8	6.7	9.1	11.3	9.5
Mid	7.1	8.5	7.8	6.9	7.2	7.1	7.2	8.4	8.6	9.8	7.5	6.7	8.5	10.7	8.9
High	6.9	8.3	7.6	6.7	7.2	6.6	6.9	8.7	8.3	9.4	7.2	6.6	8.2	10.0	8.7
At CPI of 8%															
Low	8.9	9.9	9.5	9.1	9.1	8.8	8.4	9.9	9.9	11.0	9.1	8.5	10.1	11.5	10.3
Mid	8.1	9.4	9.1	8.4	8.1	8.0	8.0	9.4	9.4	10.3	8.8	8.4	9.5	10.9	9.6
High	7.7	9.1	8.9	8.1	7.9	7.4	7.6	9.6	9.0	9.9	8.4	8.3	9.2	10.2	9.4
At CPI of 10%															
Low	10.4	11.3	10.9	11.4	10.8	10.0	9.7	10.8	11.4	12.3	10.7	10.3	11.4	12.3	10.4
Mid	9.4	10.7	10.5	10.2	9.5	9.0	9.2	10.2	10.8	11.4	10.2	10.2	10.7	11.6	10.7
High	8.9	10.3	10.3	9.7	9.2	8.3	8.7	10.3	10.3	10.9	9.8	10.1	10.3	10.9	10.4
Non-Commercial															
At CPI of 6%	7.7	7.4	7.2	6.3	8.2	8.3	7.5	6.7	6.9	8.7	7.4	6.5	8.7	10.4	8.7
Low	7.1	7.3	7.0	6.3	7.1	8.0	7.1	6.6	6.9	8.1	7.4	6.5	8.4	9.4	7.5
Mid	7.1	7.1	7.0	6.3	7.2	8.0	6.9	6.7	6.8	7.3	7.2	6.5	8.2	10.1	7.5
High															
At CPI of 8%															
Low	8.7	8.6	8.8	7.9	9.1	9.4	8.0	7.2	7.3	9.3	9.0	8.4	9.4	10.7	9.7
Mid	7.9	8.5	8.6	7.6	7.9	9.1	7.6	7.1	7.3	8.5	8.9	8.4	9.2	9.7	8.5
High	7.9	8.3	8.6	7.5	7.9	9.1	7.4	7.2	7.2	7.5	8.8	8.4	9.0	10.4	8.6
At CPI of 10%															
Low	10.5	10.1	10.5	9.9	11.0	11.1	9.0	8.3	8.6	10.2	10.7	10.3	10.7	11.9	10.9
Mid	9.4	10.0	10.3	9.2	9.5	10.8	8.6	8.2	8.5	9.1	10.6	10.3	10.5	10.8	9.7
High	9.3	9.8	10.3	8.9	9.4	10.8	8.3	8.2	8.4	8.0	10.5	10.3	10.3	11.5	9.8

Table 13 (continued)

				1978				1979				1980			
	1978	1979	1980	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Commercial															
At CPI of 6%															
Low	7.8	9.3	9.7	7.9	8.0	7.6	7.6	9.3	9.0	10.5	8.1	7.9	9.5	11.5	9.9
Mid	7.2	8.8	9.1	7.3	7.4	6.9	7.2	8.9	8.7	9.9	7.7	7.5	8.6	11.1	9.5
High	6.7	8.6	8.6	7.1	7.0	6.4	6.8	9.2	8.4	9.7	7.2	7.2	8.3	9.9	9.1
At CPI of 8%															
Low	9.0	10.2	10.5	10.1	9.2	8.7	8.6	10.6	10.0	11.2	9.2	8.9	10.6	11.8	10.6
Mid	8.2	9.6	9.9	9.0	8.4	7.8	8.1	10.0	9.5	10.5	8.6	8.4	9.7	11.3	10.1
High	7.6	9.3	9.3	8.6	7.9	7.1	7.7	10.2	9.1	10.1	8.1	8.1	9.3	10.1	9.7
At CPI of 10%															
Low	10.4	11.6	11.6	12.6	10.3	9.8	10.1	11.4	11.6	12.6	10.6	10.2	11.8	12.4	11.6
Mid	9.4	10.9	10.9	10.9	9.4	8.8	9.5	10.7	11.0	11.6	9.9	9.6	10.8	11.9	11.1
High	8.7	10.4	10.2	10.3	8.8	7.9	8.9	10.8	10.4	11.2	9.2	9.2	10.4	10.7	10.6
Of Which: Manufacturing															
At CPI of 6%	7.9	9.2	9.2	8.7	7.9	7.9	7.5	11.4	8.5	14.2	7.5	8.6	8.8	9.5	9.4
Low	7.2	8.5	8.9	7.6	7.5	7.1	7.1	10.5	8.0	13.1	6.8	8.2	8.1	9.9	9.1
Mid	6.7	8.1	8.5	6.6	7.1	6.7	6.7	10.0	7.7	12.3	6.4	7.9	7.8	9.0	9.0
High															
At CPI of 8%															
Low	9.1	10.5	9.8	9.8	9.1	9.2	8.4	13.3	9.9	14.5	8.9	9.1	9.9	9.8	10.1
Mid	8.2	9.6	9.5	8.6	8.5	8.2	7.9	12.1	9.2	13.3	8.0	8.7	9.1	10.1	9.7
High	7.6	9.0	9.1	7.4	8.0	7.6	7.3	11.5	8.7	12.6	7.4	8.3	8.6	9.2	9.6
At CPI of 10%															
Low	10.4	11.9	10.9	10.9	10.4	10.6	9.8	15.4	11.3	15.0	10.2	9.8	11.0	10.9	11.3
Mid	9.3	10.8	10.5	9.5	9.5	9.3	9.1	13.9	10.4	13.7	9.1	9.2	10.0	11.2	10.8
High	8.6	10.0	10.0	8.2	8.9	8.6	8.4	13.1	9.7	12.9	8.4	8.8	9.4	10.2	10.6

Source: EAB Research File, Labour Canada

Table 14

Major Wage Settlements with COLA
Number of Agreements and Employees

	1978	1979	1980
1) All Industries			
Base Rate			
No. of Agreements	131	155	183
No. of Employees	231 265	435 170	530 990
Low, Mid & High Rates			
No. of Agreements	128	142	174
No. of Employees	207 060	343 125	510 835
1a) Non-Commercial			
Base Rate			
No. of Agreements	39	27	78
No. of Employees	82 540	74 710	323 345
Low, Mid & High Rates			
No. of Agreements	38	27	75
No. of Employees	81 980	74 710	309 135
1b) Commercial			
Base Rate			
No. of Agreements	92	128	105
No. of Employees	148 725	360 460	207 645
Low, Mid & High Rates			
No. of Agreements	90	115	99
No. of Employees	125 080	268 415	201 700
Of Which: Manufacturing			
Base Rate			
No. of Agreements	55	71	73
No. of Employees	74 705	120 600	97 795
Low, Mid & High Rates			
No. of Agreements	54	64	69
No. of Employees	69 205	92 640	93 400

Source: EAB Research File, Labour Canada

V - CONCLUSION

The contractual form of wage indexation by means of COLA clauses has increased considerably during the past decade. The proportion of employees covered by COLA clauses in major collective agreements in force (all industries excluding construction) rose from 19 percent in 1971 to 47 percent in 1980. The absolute level of employees covered increased from 300,000 in 1971 to about 1 million employees in 1980. During most of this period, bargaining parties faced considerable uncertainty created by high and variable inflation rates. Increasing use of COLA clauses was made to protect wages against unexpected inflation. This growing incidence was traced in Section II of this paper. It was found that the number of major agreements in force with COLA paralleled the rate change in the CPI. We also reviewed some characteristics of COLA agreements settled in 1978-79 and established that they were on average of longer duration and more prevalent in larger bargaining units. Brief mention was made of the types of wage increments negotiated in such agreements. Lastly, characteristics of COLA clauses were discussed and reference was made as to the implications for the wage structure of bargaining units.

The observed difference in reported base rate increases between COLA and Non-COLA agreements was a major reason for undertaking the evaluation and quantification of such clauses. Our approach and methods were outlined in Section III. Wage concepts, appropriate to the analysis, were defined which included the effective wage rate (and increases) as well as the negotiated wage rate (and increases). Two examples, using different formula types were presented to illustrate the generation of the effective wage increases at selected inflation rates. In order to examine the impact of different wage increment and COLA formula types we selected three wage rates representative of the wage schedule in each bargaining unit. We also defined the Wage Indexation Factor (WIF) designed to capture the quality of the COLA clause with respect to negotiated wage increases at given inflation rates.

In Section IV, we presented estimates of effective wage increases assuming steady inflation rates. The results demonstrate that the difference between currently reported and estimated effective wage increase can be considerable. The difference depends on the quality of COLA clauses, the employee weight of COLA agreements in a given time period and upon the rate of inflation. We also found that the quality of COLA clauses varies considerably and is related to the size of the negotiated increase, the nature of the formula and the restrictions placed upon it (e.g., triggers, caps and non-operating periods). To assess this quality across wage levels and inflation rates, we used the Wage Indexation Factor (WIF) which related the amount of COLA generated to the inflation rate. On average, WIF values indicated that COLA clauses do not fully protect negotiated increases from inflation. In terms of

selected wage levels (Low, Mid and High wage rates) the protection of negotiated increases was greater at lower wage levels. This result is not surprising given the combination of wage increment and COLA formula types. Clearly, this has an impact on the wage relativities in bargaining units.

In general, even though the negotiated wage increases were not fully protected from inflation (as measured by WIF) they were large enough to provide varying real wage gains even at an assumed inflation rate of 10 percent. Finally, the response of effective wage increases to changes in the inflation rate was estimated. Using regression analysis, we estimated the response of effective wage increases over an inflation range of 0 to 14 percent. Our estimates for the commercial sector in 1980 indicate that each percent increment in the CPI will yield a 0.56 percent increment in effective wage increases over an inflation range of 8 to 14 percent.

Much of the empirical data used in this paper came from the EAB Research File designed to facilitate estimation of wage increases including COLA at various assumed and actual inflation rates. Projects currently underway using this database include the verification of actual COLA payments associated with actual CPI movements over the contract term, an analytical comparison of agreements with and without COLA clauses and analysis of wage compression.

APPENDICES

APPENDIX 1

Definition of Commercial / Non-commercial Sectors

The commercial/non-commercial aggregations correspond with the SIC of Statistics Canada based on the principal industrial activity of the employer[1]. The respective SIC range and industries included in major wage settlements excluding construction are outlined below.

Sector	SIC Range	Included Industries
Commercial	001 to 399 501 to 737 & 841 to 899	- Agriculture - Forestry - Fishing and Trapping - Mines, Quarries and Oil Wells - Manufacturing - Transportation, Communications and Other Utilities - Trade - Finance, Insurance and Real Estate - Community, Business and Personal Service Industries (excluding: Education and Related Services, Health, and Welfare Services and Religious Organizations)
Non-commercial	801 to 831 & 902 to 991	- Public Administration and Defence - Education and Related Services - Health and Welfare Services and Religious Organizations

[1]See Standard Industrial Classification Manual, revised 1970 Dominion Bureau of Statistics, Catalogue no. 12-501 occasional.

APPENDIX 2

Table 1

Major Agreements In Force - All Sectors
End of Period, 1971 - 1980
Total, COLA, Non-COLA

	TOTAL		COLA		NON-COLA	
End of	Agreements	Employees	Agreements	Employees	Agreements	Employees
1971	827	1 630 734	112	303 819	715	1 326 915
1972	831	1 663 612	122	356 192	709	1 307 420
1973	841	1 720 683	155	423 373	686	1 297 310
1974	881	1 811 201	261	631 407	620	1 179 794
1975	950	1 846 194	383	884 982	567	961 212
1976	1 020	2 073 111	370	910 265	650	1 162 846
1977	1 014	2 093 672	316	804 351	698	1 289 321
1978	1 014	2 097 368	315	734 646	699	1 362 722
1979*	983	2 067 175	347	916 725	636	1 150 450
1980*	983	2 076 936	368	965 920	617	1 112 196

*Estimates

Source: Tables 1 to 4 - Collective Agreements Data Base, Labour Data Branch, Labour Canada

Table 2

Major Agreements In Force - Commercial Sector
End of Period, 1971 - 1980
Total, COLA, Non-COLA

	TOTAL		COLA		NON-COLA	
End of	Agreements	Employees	Agreements	Employees	Agreements	Employees
1971	585	969 839	101	257 634	484	712 205
1972	579	953 955	110	252 107	469	701 848
1973	595	971 931	137	294 263	458	677 688
1974	607	1 000 573	221	437 352	386	563 221
1975	615	1 011 344	309	624 357	306	356 987
1976	619	1 047 398	280	609 285	339	438 113
1977	616	1 065 906	234	533 766	382	532 140
1978	610	1 053 906	225	426 381	385	627 255
1979*	585	1 019 960	250	526 470	335	493 490
1980*	583	1 026 581	269	587 210	315	440 051

*Estimates

Table 3

Major Agreements in Force - Manufacturing
End of Period, 1971 - 1980
Total, COLA, Non-COLA

	TOTAL		COLA		NON-COLA	
End of	Agreements	Employees	Agreements	Employees	Agreements	Employees
1971	352	481 221	82	185 582	270	295 639
1972	346	476 043	82	186 326	264	289 717
1973	357	478 313	100	205 252	257	273 061
1974	357	484 364	151	296 352	206	188 012
1975	357	475 534	202	321 236	155	154 298
1976	351	475 248	179	291 980	172	183 268
1977	340	468 885	139	229 785	201	239 100
1978	340	464 190	149	242 705	191	221 485
1979*	320	433 325	154	223 225	166	210 100
1980*	317	433 955	166	257 060	153	187 895

*Estimates

Table 4

Major Agreements in Force - Non-Commercial Sector
End of Period, 1971 - 1980
Total, COLA, Non-COLA

	TOTAL		COLA		NON-COLA	
End of	Agreements	Employees	Agreements	Employees	Agreements	Employees
1971	242	660 895	11	46 185	231	614 710
1972	252	709 657	12	104 085	240	605 572
1973	246	748 752	18	129 110	228	619 642
1974	274	810 628	40	194 055	234	616 573
1975	335	834 850	74	260 625	261	574 225
1976	401	1 025 713	90	300 980	311	724 733
1977	398	1 027 766	82	270 585	316	757 181
1978	404	1 043 732	90	208 265	314	835 467
1979*	398	1 047 215	97	390 255	301	656 960
1980*	400	1 050 355	99	378 710	302	672 145

*Estimates

APPENDIX 3

Typical COLA Clause

Effective May 27, 1978, fifty two cents (52¢) of the $1.02 cost-of-living allowance as in effect on May 26, 1978, will be removed from the cost-of-living allowance and will be added to the wage rates listed in the "Job Classification and Wage Rate Schedule" and also effective May 27, 1978, the cost-of-living allowance payable pursuant to the provisions of the article will be fifty cents (50¢) per hour.

Effective as of the first Monday following the Company's receipt of the Statistics Canada Consumer Price Index (1971=100) for the months set forth below, Table 1, the cost-of-living allowance shall be increased or decreased by one cent (1¢) per hour for each thirty-four hundredths (0.34) point change in the Index from the Index for May 1978 (1971=100) in accordance with Table 1.

Table 1

Based on Consumer Price Index of

August 1978
November 1978
February 1979
May 1979
August 1979
November 1979
February 1980
May 1980
August 1980
November 1980
February 1981

At the time of each adjustment during the five quarterly periods beginning with the adjustment based on the August 1978 Index and ending with the adjustment based on the August 1979 Index, the cost-of-living allowance shall be reduced by two cents (2¢) for a cumulative reduction during these five (5) quarters of ten cents (10¢).

No adjustments, retroactive or otherwise will be made due to any revision which may later be made in published figures of the Index for any base month.

The continuance of the cost of living allowance will be dependent upon the availability of the official monthly Consumer Price Index in the same form and calculated on the same basis as the Index for May 1978 (base 1971=100). Should that Index be discontinued the parties agree to request Statistics Canada to make available for the duration of this agreement a monthly Index in the present form and calculated on the same basis as the index for May 1978 (base 1971=100).

Notwithstanding any other provisions of this article, if Statistics Canada revises the Index based on the 1974 Family Expenditures Survey and issues such revised Index as the Official Index (base 1971=100), the term "Index" whenever used in this article shall refer to such revised Index.

The cost-of-living allowance to employees shall be computed and paid on the basis of the actual hours worked by each employee and shall not be factored into the computation for overtime pay.

APPENDIX 4

Rates of Change: End Values and Time Weighted

Wages increases are estimated by taking the per cent difference between the starting and final value. Depending upon the needs of the analysis, however, the final wage can be expressed in different ways. The usual estimate of wage increase takes the final wage actually paid to the employee as a percentage of starting wage. Therefore, a labourer, previously paid $7.00 per hour receives a 9.71 percent increase if he is paid a wage increment of 50 cents and COLA of 18 cents over the course of the contract.

$$\frac{\$7.68}{\$7.00} - 1) \text{ X } 100 = 9.71\%$$

Another way of expressing the same change is to use a time-weighted estimate. For example, suppose the 50 cent wage increment over the 12-month contract was divided, with 25 cents payable at the start and the remainder six months later. In addition, the 18 cents COLA is spread over two payments: 2 cents at the start of the tenth month, and 16 cents at the start of the last month. Under this regime a 25 cent wage increment is paid to each worker for the full twelve months, 25 cents for six months, 2 cents for three months and 16 cents for one month. When weighted by the number of months paid, the end wage becomes $7.39 and the percent wage increase is 5.57 percent.

$$\$7.00 + \frac{(\$.25 \text{ X } 12) + (\$.25 \text{ X } 6) + (\$.02 \text{ X } 3) + \$.16}{12} = \$7.39 \text{ end wage}$$

Percent increase is $\frac{\$7.39}{\$7.00} - 1) \text{ X } 100 = 5.57\%$

Note that the time-weighted end wage of $7.39 is an artificial construct used to calculate the time-weighted percentage wage increase of 5.57 percent. This represents the cost to the employer of the negotiated package which gives the employee a final wage of $7.68 and an overall wage level advancement of 9.71%.

APPENDIX 5

Notes on WIF & Other Elasticity Measures

To obtain a measure of COLA quality, it is necessary to assess the amount of COLA generated as a quantity separate from but related to the amount of the negotiated increase.

A measure termed the Wage Indexation Factor (WIF), has been derived which estimates the extent of wage change due to COLA with respect to a change in the price level (or the inflation rate). The formula for WIF is given below. The numerator measures the average annual per cent change in wages due to COLA; the denominator, the corresponding per cent change in the price level, or inflation rate.

$$\frac{\left(\frac{W_p + \sum_i (w_i + c_i)}{W_p + \sum_i w_i}\right)^{\frac{12}{t}} - 1) \times 100}{\dot{p}}$$

Where W_p is the previous wage

$\sum_i (w_i + c_i)$ is the sum of i negotiated wage increments (w_i) and COLA payments (c_i)

t is the duration in months

$\sum_i w_i$ is the sum of i negotiated wage increments

$\dot{P}$ is the average annual per cent change in the price level (or inflation rate)

The WIF captures all aspects of the COLA clause in one figure providing an estimate of the quality of wage protection in relation to the negotiated wage increase. It permits comparisons of agreements with COLAs across bargaining units, wage levels, and inflation rates. A WIF value of unity means that every unit increase in the price level (at a given inflation rate) generates an equivalent response in wages due to COLA. In this case, wage payments generated by the COLA clause fully compensate for the effects of inflation on the negotiated wage increase.

An alternative method of assessing the quality or elasticity of COLA clauses is the following:

$$\varepsilon = \frac{\left(\frac{W_p + c_i}{W_p}\right)^{\frac{12}{t}} - 1) \times 100}{\dot{p}}$$

Rather than focusing on the relationship of current COLA to the negotiated increase, this method relates it to the previous wage[1]. As it involves this different base, will be greater than WIF except when there are no negotiated increases.

To illustrate we use one of the examples in the text. Consider that the labourer is making $7.00 per hour and 18 cents COLA is generated at 10 percent inflation. In the first instance, where the negotiated increase amounts to 50 cents, the WIF value is 0.24 -- that is, there is about one quarter of a unit wage change which is attributable to COLA for every unit increase in the CPI level (appropriate to the 10 percent inflation rate). By way of contrast, the elasticity using the previous wage rate level alone is 0.257.

$$\frac{\left(\frac{\$7.18}{\$7.00} - 1\right) \times 100}{10} = 0.257$$

A third method of assessing COLA responsiveness is available. Instead of measuring growth of wages due to COLA over the contract term at a steady rate of inflation, it measures change in wages due to COLA arising from a change in the inflation rate itself. The formula for this elasticity is essentially

$$\frac{\text{percentage change in wages due to COLA}}{\text{percentage change in the inflation rate}}$$

Again, using the text example for labourer and recalling that 6 cents COLA was generated at 8 percent inflation, we have an elasticity of 0.857 [2]. This means that a unit change in the inflation rate (from 8 to 10 percent) causes a 0.857 unit change in wages due to COLA. Clearly, COLA formula response to a change in the rate of inflation at a given point in time is different from the response over time at a given rate.

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[1] For data using this alternative method, consult David A. Wilton "An Analysis of Canadian Wage Contracts With Cost of Living Clauses", Economic Council of Canada, Discussion Paper no. 165, March 1980

[2] $$\left(\frac{\$7.68}{\$7.56} - 1\right) \times 100\right) \div \left(\frac{1.10}{1.08} - 1\right) \times 100\right) = 0.857$$